kHz equipment by a variety of manufacturers, should lead the way to 6.25 kHz.[37/]

Further, as Motorola notes, reducing the occupied bandwidth of the transmitted signal will not allow new users to acquire the "new" channels because existing

until at least the late 1990s.[40/] Wishful thinking on the part of the Commission with regard to equipment development is not enough: utilities and other large PLMR users require affordable equipment with full functionalities to meet critical communication requirements today.[41/]

As is clear from the Comments, there is very little

producing evidence of the adverse effect, as of the year 2004, of very narrowband channels on the use of radio in industry operation.[43/]

AASHTO also supports a reduction to very narrowband channels, but does not present a timeline for the reduction to very narrowband channels. Instead, AASHTO cautiously recommends that very narrowband channels not be mandated before viable, commercially available equipment has been type-accepted.[44/] APCO's narrowband plan also treats conversion to 6.25 kHz channels cautiously. Mandatory conversion to very narrowband channels is delayed until an unspecified "distant point" sometime around 2014.[45/] MCI Telecommunications Corporation's (MCI) support of very narrowband channels also includes a substantial and non-specific delay in reductions to very narrowband channels of between 10 to 18 years.[46/]

The most vocal support for the reduction to very narrowband channels comes from narrowband equipment manufacturers. Uniden America Corporation (Uniden), for example, argues that a reduction to 5 kHz channels would

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[43/] AICC, p. 7.

[44/] AASHTO, p. 4.

[45/] APCO, p. 18.

[46/] MCI, p. 2.

provide additional channels, make frequency management easier and make equipment manufacturing easier if 5 kHz channels are also implemented for the VHF band.[47/] SEA argues that the reduction would eliminate marketplace ambiguity, eliminate the need for interim 12.5 kHz equipment and realize "near term efficiency gains."[48/]

However, Uniden's and SEA's comments do not demonstrate that the additional channels that would be provided by a reduction to 5 kHz would outweigh the significant costs and hardships imposed on users. Nor do they explain how frequency management would be significantly easier under a 5 kHz channel scheme, especially in light of the tremendous number of waivers that would undoubtedly be requested by users whose operations are not able to adjust to 5 kHz channels. Nor do these comments adequately explain why the needs of equipment manufacturers should drive the FCC's decision to further reduce channel bandwidth. Nor do the comments explain how marketplace ambiguity would be eliminated by adopting a transition plan which requires equipment which is not yet commercially available and which has not been tested in a real-world environment to ensure that it is able to meet the demands of PLMR users in the U.S.

[47/] Uniden, p. 3.

[48/] SEA, p. 17.

When viewed together, the comments suggest that the Commission's plan is based on either a fundamental lack of knowledge of basic "real-world" engineering principles, or a profound indifference with regard to the impact of its proposal on existing users. In either event, adoption of the Commission's proposal as currently written would constitute a gross disservice to the public.

B. The Commission Should Adopt A Gradual Transition That Emphasizes The Use Of 12.5 kHz Channels

The overwhelming majority of comments representing the views of actual PLMR licensees favors, with slight variations, the adoption of the Land Mobile Communications Council's (LMCC) "Option A" for the rechannelization of the 150-174 MHz VHF high-band.[49/] Significantly, 14 of the 19 existing PLMR services expressed general support for at least the major components of LMCC's Option A.

Option A permits a graceful conversion to narrower channels (e.g., 12.5 kHz at first), with the possibility of reducing to 6.25 kHz at such point as radio equipment becomes readily available at this bandwidth and only if it is concluded that further channel reductions will actually increase spectrum efficiency. (For example, growth in TDMA

[49/] UTC is a member of LMCC and participated in the development of its industry "consensus plan," filed with the FCC on April 28, 1993. A complete description of LMCC Option A is included in the consensus plan.

may dictate against further channel splitting). The plan provides for the gradual replacement of equipment with dual-mode 25/12.5 kHz radios so that existing equipment can be fully amortized before any mandatory conversions.[50/]

The only modification to the LMCC "Option A" that UTC suggested is with regard to the treatment of existing systems licensed in rural areas where spectrum congestion is not a concern. Because there is little, if any, spectrum congestion in rural areas, it makes no sense to force private radio users in rural areas to undergo the expense and effort of a conversion to narrowband technology. Therefore, UTC continues to recommend that systems located beyond 100 miles from any of the top 100 urban areas be allowed to operate at 25 kHz on a primary basis indefinitely. However, these systems would be ineligible for Exclusive Use Overlay status until they convert to narrowband technology. As noted in UTC's comments, denial of EUO status would serve as an incentive for rural users to employ more efficient technology on a voluntary basis. It should be emphasized that even under UTC's proposal rural systems will gradually migrate to

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[50/] In discussing "Option A", it is assumed that the FCC would revise its spectrum efficiency standard to reflect that the equivalent of only one voice channel will be required per 12.5 kHz channel.

narrower bandwidth equipment because after 1996 all new equipment will be narrowband.

The use of frequency synthesized radio equipment will allow for the frequency shift required by Option A. This equipment is already employed in many of the new radio systems that are currently being purchased, and will be commonplace by the time of the 2004 shift.

C. LMCC "Option B" Should Be Rejected

There was little support expressed for the "Option B" transition plan contained in the LMCC Industry "Consensus Plan."[51/] Option B would forego the interim conversion to 12.5 kHz channelization and move directly to 6.25 kHz

"Option A," because it would require two equipment change-outs to achieve true very narrowband operations.[54/] This however, assumes that very narrowband equipment will be available in the near term and that this equipment will be able to satisfy the anticipated throughput requirements of private users. On both points the Coalition itself expresses doubt stating:

> [T]he proposed 5 kHz channelization of the 72-76 and the 150-174 MHz bands and the 6.25 kHz channelization of the 421-512 MHz band is premature. Radio equipment for operation with 5 or 6.25 kHz channels is not readily available now. Moreover, there is considerable doubt as to whether a full line of narrowband equipment would be available from competitive suppliers before the end of the decade. Additionally, it is not generally accepted that channelization based on 5 or 6.25 kHz channels would be the most effective approach to spectrum efficiency in the foreseeable future.[55/]

Given these doubts by the plan's proponents, UTC continues to oppose Option B. Further, the plan ignores the reality that many large users, such as public service utilities, with on-going operations must be able to make purchasing decisions based on what is presently available and likely to be available in the immediate future. Thus, licensees will be forced to either delay equipment purchases until adequate and reasonably priced 6.25 kHz

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[54/] Coalition, p. 7.

[55/] Coalition, p. 4.

equipment is available or risk the loss of all equipment purchased during the interim conversion to 6.25 kHz.

Finally, Option B would hinder the ability of users such as Public Service utilities to implement wide band mobile data systems, and other advanced technologies requiring higher throughput rates.

D. VHF Offset Overlay Proposal Warrants Further Attention

While favoring LMCC Option A over both the Commission's channelization plan and LMCC Option B, UTC believes that a separate proposal raised by AAR has sufficient facial attraction to warrant further consideration. AAR has developed an "offset-overlay" plan, under which effective January 1, 1996, the FCC would rechannelize the VHF high-band into 12.5 kHz channels that would be offset by 7.5 kHz from the current channels (15 kHz channel spacing currently). In other words, one channel 12.5 kHz wide would be created every 7.5 kHz, so that for every 15 kHz of spectrum there would be two channels, each 12.5 kHz wide, with one overlapping the other.[56/] Under AAR's proposal, in the 2008-2014 timeframe users in metropolitan areas still experiencing spectrum congestion would be required to convert to very narrowband equipment.

[56/] AAR, pp. 27-30.

According to AAR, the new overlapping channels would nearly double the number of channels available to users and would cost significantly less to implement than the Commission's proposal.[57/] In addition, AAR claims the plan also would allow for:

> Bandwidth on demand in trunked systems to accommodate wideband applications;
>
> Two-way conversation on an effective single 7.5 kHz channel rather than a pair of 5 kHz channels (10 kHz total);
>
> Existing licensees to retain current frequency assignments, facilitating interoperability in rural areas where new equipment may not be required; and
>
> Option of future migration to very narrowband plan at future date.[58/]

Another possible benefit of the offset overlay plan is that it would effectively delay the need to shift frequencies until, and if, a transition to 6.25 kHz is required. Further, the plan would better accommodate the large number of load shedding operations that are currently deployed by utilities on an ancillary basis on primary land mobile channels throughout the VHF high-band because receivers would not have to be replaced to account for a frequency shift.

[57/] AAR, p. 30.

[58/] AAR, pp. 30-34.

However, UTC has a number of concerns regarding the AAR plan. A fundamental concern of UTC's is that under the AAR plan all of the new channels will have to be coordinated on a geographically separated non-interfering basis to adjacent channel operations. This may prove difficult in many areas of the Western United States where site locations are few and far between. This problem could be exacerbated if new sites are required to provide fill-in coverage as a result of the Commission's proposed power/height limitations. Further, the predusion zones of the "new" channels could hinder the expansion of existing adjacent channel systems or the addition of new systems on existing high-band channels.

Another concern is the degree to which the AAR proposal will increase the potential for adjacent channel interference. AAR has not provided any information on the actual extent of channel overlap, and relatedly the amount of geographic separation that would be required between adjacent channel systems. If such interference potential is increased over what it is for the current 15 kHz channeling plan, it may be necessary to adopt greater milage separation distances which would effectively limit the use of new channels gained by the plan.

Finally, UTC is concerned that while the AAR plan would not require users to undergo an initial channel shift in transitioning to 12.5 kHz channels, ultimately a channel shift would still be required if a conversion to 6.25 kHz is mandated. Thus, UTC questions whether it would be less painful in the long run to undergo the shift at the "front-

devices represent a significant investment and are critical to many of the innovative programs that the utility industry has recently undertaken to conserve energy, protect the environment, and minimize the need for additional generating capacity.

UTC reiterates its request that the FCC clarify that the Commission's proposed ERP/HAAT limits would not apply to the load shedding channel.[60/]

If LMCC Option A is ultimately adopted, UTC recommends that "bookend" channels be created in order to preserve the splinter channels. These bookend channels would prevent the splinter channels from being absorbed in the frequency shift of Option A. The bookend channels could themselves be used as new splinter channels.

F. Innovative Shared Use Channels Should Not Be Implemented

The only support for the development of "innovative shared use" (ISU) systems in the VHF high-band came from wireline carriers that are themselves ineligible for licensing on these frequencies.[61/] The desire for these carriers to obtain ISU licensing underscores precisely why

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[60/] See also Section V.B., below.

[61/] Southwestern Bell Corporation, pp. 16-17; and GTE Service Corporation, pp. 4-5.

these systems should not be developed as it would be a complete anathema to the fundamental purpose of the Private Land Mobile Radio Services and would be contrary to the public interest.

Commenters as diverse as APCO and AAR join UTC in adamantly opposing the ISU proposal.[62/] APCO argues that the ISU proposal must be rejected because it would reduce total radio spectrum assigned to public safety by one third; would render virtually impossible the already difficult task of coordinating adjacent channels; and would impede the ability to stack channels.[63/] The inability to stack contiguous channels would frustrate efforts of utilities to implement advanced mobile data communications systems requiring higher data throughput capabilities than are obtainable on narrowband channels.

Given the recognized need for additional internal private land mobile spectrum the Commission should not reallocate from utilities and other "non-commercial" users a significant number of channels in order to promote commercial, private carrier operations. UTC agrees with AAR that all channels gained from conversions to narrowband

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[62/] APCO, p. 9; and AAR, pp. 34-35.

[63/] APCO, p. 19.

and very narrowband technologies should be retained by the service pools from which they are derived.[64/]

G. Trunking Should Be Allowed In VHF And UHF Bands

The commenters supported an amendment to the Commission's Rules to specifically allow trunking in both the 150-174 MHz and 421-512 MHz PLMR bands. Trunking in other bands and in other services has proven to be a spectrum efficient technology and therefore its use in the bands below 512 MHz should be aggressively pursued. However, because of the unique attributes and requirements of the various PLMR users, trunking may not be the most effective or efficient technology for some licensees. Therefore, UTC continues to recommend that trunking below 470 MHz be encouraged rather than mandated.

As UTC noted in its comments, the size of trunked radio systems implemented in the bands below 512 MHz will vary depending on the service area and requirements of the individual licensees. Therefore, different co-channel concurrence rules will have to be developed to account for different sized systems; for example, correlate the area in which a licensee must secure co-channel concurrence to the size of the licensee's service area. Further, it may be

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[64/] AAR, p. 35.

necessary to limit trunking below 512 MHz to systems that have obtained EUO status.

AAR and others agree with UTC in supporting the development of mandatory technical standards in order to ensure that minimum levels of efficiency and systems interoperability are achieved.[65/] The adoption of an open air interface standard would facilitate true competition among vendors, which in turn would lower equipment costs and increase options for private radio licensees.[66/]

Finally, UTC renews its recommendation that the Commission develop a channel pairing scheme for the 150-174 MHz band. Such a plan is necessary in order to facilitate trunking in the high-band and to allow use of technologies such as TDMA.

IV. THE 421-512 MHZ BAND

A. Comments Support A Modified LMCC Transition Plan

UTC objects to the Commission's impractical proposal to transition the 421-512 MHz band to narrowband channels. Under the Commission's two-step bandwidth reduction plan,

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[65/] AAR, pp. 38-39.

[66/] MPT 1327 is an example of a government-endorsed trunking standard that has successfully been implemented by utilities in the United Kingdom.

an initial reduction in bandwidth to 12.5 kHz would be accomplished through a "screwdriver" adjustment to existing transmitting equipment. All new equipment would be required to be "true" 12.5 kHz. The second step, the reduction to 6.25 kHz channels, would be phased-in throughout the country beginning in 2004.

As explained in detail in Section III.A above, there is widespread opposition to the Commission's proposed transition plan. The Commission should, therefore, abandon its transition plan in favor of the more reasonable and graceful plan proposed by UTC. This plan, a modification of the LMCC "Consensus Plan" for the UHF band, would double

comments filed by numerous parties in support of the LMCC "Consensus Plan" for the UHF band in whole or in part, including: AAA, API, AAR, the Coalition, EFJ, International Municipal Signal Association, International Association of Fire Chiefs, Inc., and National Association of State Emergency Medical Service Directors (collectively IMSA), Joint Commenters, MPC, and Public Safety Communications Council (PSCC). Thus, the basis for UTC's plan, the LMCC "Consensus Plan," is widely supported.

Additionally, UTC's modifications to the LMCC "Consensus Plan" are also favored by many parties. Several parties support the concept of permitting wideband use in areas where frequency congestion is not a problem. AASHTO, for instance, states that, because channel congestion is not consistent throughout the U.S., exemptions from narrowbanding should be permitted in areas where there is no channel shortage, such as Alaska, Hawaii and Puerto Rico.[67/] IMSA agrees, stating "[t]o the extent rural America is not experiencing spectrum congestion, it should not be subjected to compliance with costly solutions."[68/] MPC also agrees that rural areas should be exempt from the Commission's narrowband proposals.[69/]

[67/] AASHTO, p. 5.

[68/] IMSA, p. 15

[69/] MPC, p. 8.

There is also support for UTC's plan to authorize the use of wideband operations in urban areas on a secondary basis. NABER also includes authorized secondary use of wideband channels in its transition plan for the UHF band.[70/] Like UTC's plan, NABER's plan would permit wideband users that are willing to operate on a secondary basis to do so. Additionally, secondary use of wideband equipment is also provided in at least the first phase of the transition plan proposed by APCO.[71/]

UTC fully supports the proposal by EFJ to modify proposed Section 88.433(d) in accordance with the implementation of a 12.5 kHz transition plan.[72/] As proposed, Section 88.433(d) requires systems operating in the 421-512 MHz band to meet an efficiency standard of one communications link per 6.25 kHz. Because a mandatory transition to 6.25 kHz channels should not be implemented, this section should be modified to require one communications link per 12.5 kHz.[73/]

[70/] NABER, p. 21.

[71/] APCO, p. 16. It is unclear whether secondary wideband use would continue to be permitted under APCO's second phase.

[72/] EFJ, p. 13.

[73/] UTC recognizes that additional technical modifications may be necessary to the proposed rules to ensure compatibility with a 12.5 kHz transition plan. Such changes should be made after the basic tenets of the transition plan are adopted.

B. Flexibility Should be Permitted in the Designation of Offset Frequency Pairs

As part of its transition plan, UTC urged the Commission to designate a percentage of the current offset channel pairs as primary, site-specific channels for low or high-power operation. UTC did not recommend a specific percentage of channels to be reserved for such operations but provided 80% as an example of an appropriate percentage. Primary offset licensees would be required to provide the coordinates of their transmitter sites in applications for new service or renewal after January 1, 1994.

Because UTC does not believe that one percentage would be appropriate for all services, UTC proposes that each service should initially determine the appropriate percentage of offset channels to be set-aside for site-specific and itinerant operations. Thus, to the extent consistent with this proposal, UTC supports IMSA's proposal that each radio service/coordinator be allowed to determine the number of site-specific and itinerant offset channels.[74/] However, UTC suggests that these recommendations be incorporated in the rules, and not left

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[74/] IMSA, p. 6.

to the discretion of individual coordination groups, so that all users and coordinators will know which channels are available for this purpose.

C. Low Power Telemetry Operations Should Be Authorized In The 450-470 MHz Band

In its Comments, UTC supported a slightly modified version of the Commission's proposal to authorize low power mobile stations in the 450-470 MHz band for telemetry operations. UTC recommended modifications in accordance with its 12.5 kHz transition plan to permit these low-power channels to be 6.25 kHz offset from the 12.5 kHz channel centers, and not 3.125 kHz offset. UTC also requested that the Commission clarify that low power telemetry operations of 20 mW would be permitted.[75/]

Support for the authorization of low-power telemetry operations and the 20 mW limit is also voiced by EFJ. According to EFJ, this limit would protect against harmful interference to full power operations.[76/]

The Coalition also appears to support an allocation of low power frequencies, but proposes that these frequencies

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[75/] There is a discrepancy between the text of the NPRM, which contains a 20 mW limit, and the text of proposed Section 88.1299(b), which contains a 10 mW limit.

[76/] EFJ, p. 24.

not be restricted to telemetry operations because there are uses for low power operation that do not meet the definition of telemetry operations.[77] However, the Coalition does not explain why it is unable to use other low power frequencies which are not restricted to telemetry operations.[78] Moreover, there is a tremendous need for telemetry-only operations which requires that certain frequencies be set aside specifically for this purpose.[79]

low power operations to these offset channels; or limits the low power channels to new offset channels that are 6.25 kHz offset from the new 12.5 kHz channel centers.

UTC opposes the proposal by the Coalition that low power operation be permitted on a primary basis[80/] as inconsistent with the purpose of this proceeding - to establish additional PLMR channels. The limitation placed on these low power channels ensures that these channels would not interfere with the new primary PLMR channels which are the main focus of this proceeding. Furthermore, under UTC's transition plan, certain channels in the UHF band would be designated for primary site-specific basis. No additional primary low power channels would, therefore, be necessary because these channels would satisfy the Coalition's need for such channels.

E. Fixed Operations At 150-174 And 450-470 MHz Should Be Permitted In Areas Where There Are No EUO Licensees

In its Comments, UTC disagreed with the Commission's proposal to limit secondary fixed use to situations where there is at least one Exclusive Use Overlay (EUO) licensee within 50 miles. UTC urged the Commission to permit secondary fixed use in areas where there are no EUO licensees.

[80/] Coalition, p. 17.

EFJ concurs with the Commission's proposal to limit new secondary fixed use assignments and significant modifications of existing fixed use stations to licensees with EUO assignments.[81/] While UTC agrees that a licensee proposing secondary fixed operations should seek concurrence from any potentially affected EUO licensees, UTC does not agree that there must be at least one EUO licensee in the area before secondary fixed use should be allowed. Such a restriction is unnecessary and would effectively preclude the use of vacant channels in rural areas where there are few or no EUO licensees.

V. POWER/HEIGHT AND OTHER TECHNICAL ISSUES

A. The Proposed Power/Height Reductions Are Unreasonable

The commenters were virtually unanimous in opposing the Commission's proposal to set strict limits on effective radiated power (ERP) and height above average terrain (HAAT) as a means of curtailing "overly powerful systems" and simplifying reuse of channels at standard 50-mile spacings.[82/] Commenters echoed UTC's position that

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[81/] EFJ, p. 22.

[82/] AICC, pp.24-25; AASHTO, p. 6; AAA, p. 16; AMRA, p. 5; API, p. 9; AAR, pp. 16-17; Coalition, pp.15-16; Coastal, p. 12; Joint Commenters, pp. 15-18; MCI, p. 3; Mitchell Energy and Development Corporation (Mitchell), pp. 5-6; MPC, pp. 12-13; Motorola, p. 30; NABER, p. 26; SEA, p. 10; TIA, pp. 18-19; and UTC, pp. 40-44.

arbitrary reductions in power or height will require licensees with well-defined service territories to install more base stations in order to achieve required coverage.[83/] It was pointed out that not only would such a limitation impose an enormous cost on users, it would produce no appreciable gains in spectrum reuse or provide any corresponding benefit for licensees required to reduce coverage and install more stations.[84/] It was also noted that the filing of applications to change power or height and/or to license the new sites required to fill-in coverage will increase the Commission's workload, increase demand for antenna sites, and result in higher site rental fees for all radio users.[85/]

None of the Comments reviewed by UTC indicated that there is, in fact, a problem with "overly powerful systems," and other commenters confirmed that they are not aware of major problems with over-powered systems.[86/] UTC agrees with them that the Commission should not "punish"

[83/] AAA, p. 16; API, p. 9; AAR, pp. 36-37; Coalition, pp. 15-16; MCI, p. 3; Mitchell, pp. 5-6; MPC, pp. 12-13; Motorola, p. 30 and Appendix B; SEA, p. 10, TIA, pp. 18-19; and UTC, pp.40-41.

[84/] MCI, p. 4; and Mitchell, pp. 5-6.

[85/] AICC, p. 25.

[86/] AAA, p. 16.